(12) UK Patent Application (19) GB (11) 2 126 211 A

(21) Application No **8221588**
(22) Date of filing **26 Jul 1982**
(43) Application published **21 Mar 1984**
(51) **INT CL³**
C03B 9/44 C08L 79/08 87/00
(52) Domestic classification
C1M KL
(56) Documents cited
GB 1562569
GB 1506519
(58) Field of search
C1M
C3R
(71) Applicant
United Glass plc,
(United Kingdom),
Kingston Road,
Staines,
Middlesex,
TW18 1AD
(72) Inventors
Roger John Dorey,
Ian Leonard Jacobs
(74) Agent and/or address for service
Carpmaels & Ransford,
43 Bloomsbury Square,
London,
WC1A 2RA

(54) **Take-out tongs for use in the manufacture of glassware**

(57) The present invention relates to take-out tongs for use in the manufacture of glassware.

Each tong has a jaw member comprising a thermoset composite of a particulate filler, a non-asbestos fibrous filler and a thermosetting resin, wherein each of the components of the composite is stable at temperatures up 200°C.

GB 2 126 211 A

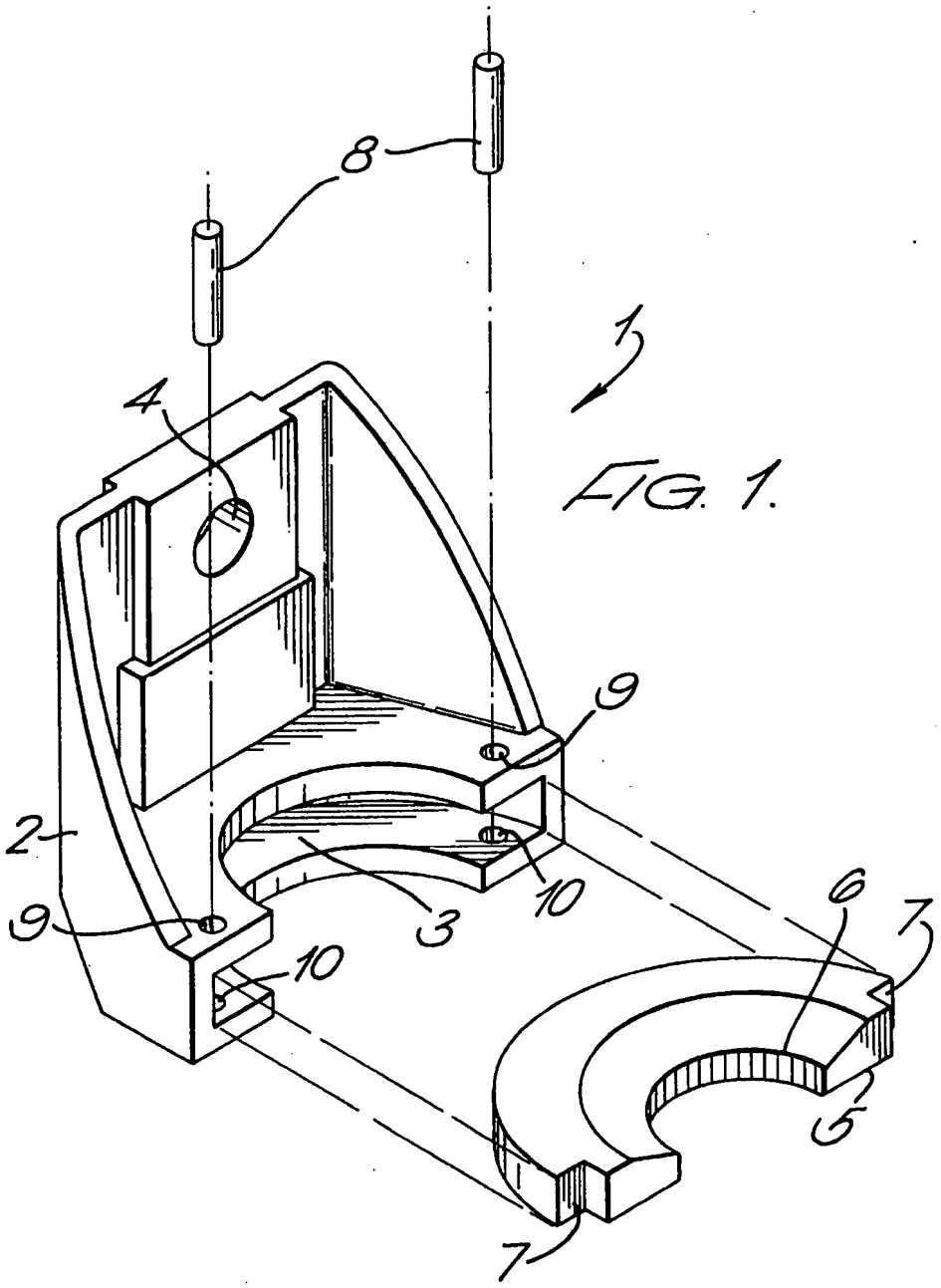

FIG. 1.

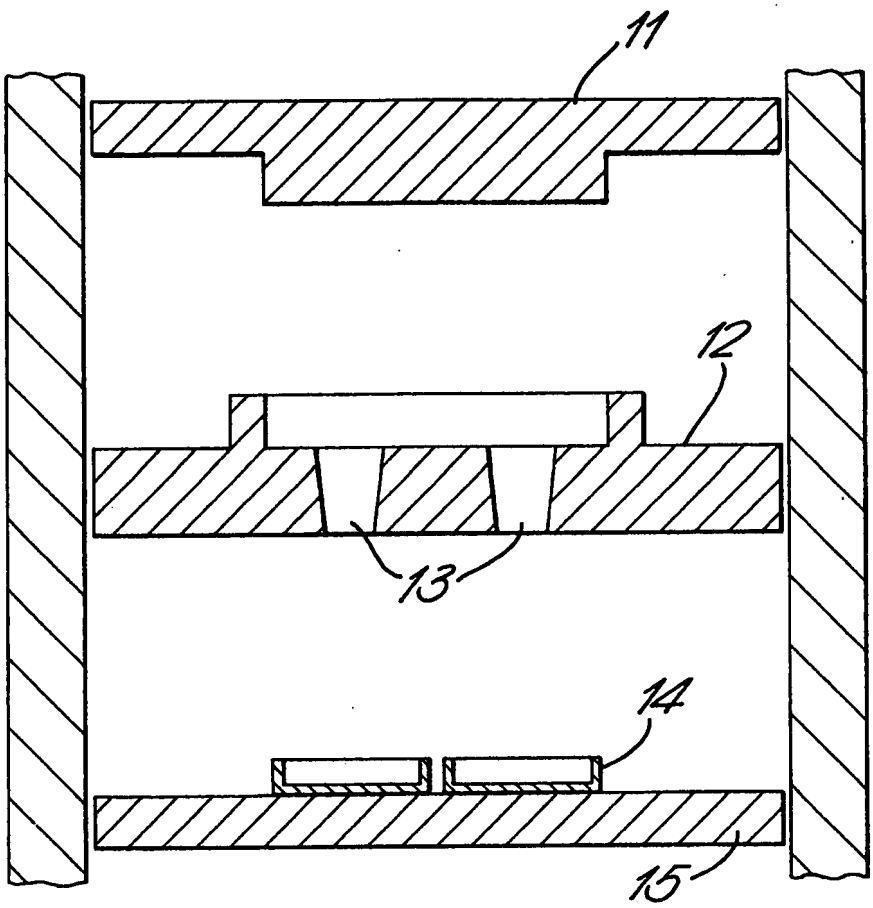

FIG. 2.

SPECIFICATION

Take-out tongs for use in the manufacture of glassware

The present invention relates to take-out tongs for use in the manufacture of glassware. In particular but not exclusively, the tongs will be of use in the manufacture of glass bottles.

In one process for manufacturing glass bottles, using an IS machine, glass is blown into a two part mould to form the bottle. The two parts of the mould are separated, leaving the bottle standing on a bottom plate. An assembly, usually known as a take-out, comprising a pair of tongs having jaw members is used to pick up the bottle. The jaw members grip the bottle around its neck underneath a bead. The bottle will be at an elevated temperature when the jaw members of the take-out contact it. The take-out transfers the bottle laterally until it is vertically above a perforated dead plate through which cooling air is passed. The bottle is held in this position for a short time and is then lowered by the take-out onto the dead plate. The jaw members are disengaged from the neck of the bottle and the bottle is then pushed from the dead plate onto a conveyor which transports the bottle to an annealing lehr.

In modern manufacturing processes of this type, it is common practice to produce bottles in pair or triplets. In these cases the take-out comprises two or three pairs of tongs and the pairs or triplet of bottles are transferred together to the dead plate.

Among the critical features on which the efficiency of the process depends, are the material from which the jaw members of the take-out are made and the area of the jaw members which contact the bottle on the bottom plate.

During transfer of bottles laterally from the bottom plate to the dead plate, a certain amount of swinging may occur. The amount of swinging will depend on the area of contact of the jaw members with the bottle. If bottles are made in pairs or triplets and a large amount of swinging occurs, there is a possibility that adjacent bottles may impact each other, rendering the bottles unfit for use.

The material from which the jaw members are made may be a metal or another highly thermally conducting material. However, if such a material is used to form jaw members of sufficient area to prevent a larger amount of swinging, there is considerable danger of chilling the hot glass on contact in such a manner as to produce a thermal shock fracture or check in the glass. Such checks need not be particularly large or even readily visible to constitute a defect. The defect may only become apparent when the formed bottle is capped in a filling operation. The force exerted on the bottle during the capping operation may be sufficient to propagate a catastrophic breakage originating at the check.

It has therefore been the practice to use take-outs having metal jaw members as small in area as possible so as to minimise the amount of metal in contact with the glass. However, this is unsatisfactory, especially in the manufacture of tall bottles, because it allows a large amount of swinging.

In an alternative process, the jaw members of the take-out have been made with a large enough area to prevent any substantial amount of swinging and from a material having low thermal conductivity and a low thermal capacity. However, it has proved difficult to find a material suitable for use in the continuous manufacturing processes presently used. For instance, ceramic materials have been used, but these are brittle and easily chipped. A chipped ceramic jaw member eventually renders the take-out incapable of performing its function of picking up bottles.

Asbestos reinforced composites have been used to form jaw members for take-outs. However, they suffer from a number of disadvantages. They have poor mechaical strength and are porous. Due to their porous nature, such composites tend to pick up oil which is carbonised by the heat of the bottles. The carbonised oil particles produce a surface of high thermal conductivity which readily produces checks in the hot glass.

Another disadvantage of asbestos composites is that it is necessary to machine the jaw member from flat stock of the composite. Due to the hazardous nature of the asbestos contained in the composite, such machiniing operations have to be carried out in carefully controlled conditions to ensure that contamination of the atmosphere with asbestos remains below the maximum permitted level. This is another disadvantage of these composites, as it is difficult and expensive to maintain suitable control over the conditions.

It is an aim of the present invention to provide tongs for use in a take-out which at least in part overcome these disadvantages.

Therefore, according to a first aspect of the present invention, there is provided a tong for use in a take-out in the manufacture of glassware, the tong having a jaw member comprising a thermoset composite of a particulate filler, a non-asbestos fibrous filler and a thermosetting resin, wherein each of the components of the composite is stable at temperatures up to 200°C.

Preferably, the components of the composite and stable at temperatures up to 250°C.

Preferably, the composite comprises 20 to 50% w/w particulate filler, 5 to 20% w/w fibrous filler and 30 to 75% resin. Advantageously, the composite comprises 40 to 70% w/w resin.

The particulate filler is preferably graphite, but may also be any of the fillers known in the art, for instance slate dust, carbon black, powdered shale or talc. Conveniently, the particular filler has an average particle size of about 10 μm and a maximum particle size of about 50 μm.

The fibrous filler may be a ceramic fibre, such as rockwool, glass fibre or an organic polyamide fibre such as that sold under the trade mark

"Kevlar" but is preferably a carbon fibre. The carbon fibre may be derived from coal tar pitch or synthetic polymers such as polyacrylonitrile. Preferably, the fibres have a length of up to 10 mm and a diameter of about 8 μm.

Several resins have been developed which are stable at temperatures up to 200°C or even higher. These include polyimide, poly-(amide-imide), polybenzimidazole, Friedel-Craft and polyphenylene resins. Any of these may be used to form the composite of which the jaw member is comprised. Preferably, the resin is a polyimide resin. Suitable commercially available polyimide resins include those sold under the trade marks "Kapton" (a resin derived from pyromellitic anhydride) and "Kinel" (a resin derived from bis-maleimide).

A resin composition comprising graphite (35% w/w), carbon fibre (10% w/w) and a polyimide resin (55% w/w) is commercially available under the trade mark "Cerberite". This may advantageously be used to form the thermoset composite of which the jaw member is comprised.

The jaw member may be made by compression moulding, transfer moulding or injection moulding. Preferably the resin is thermost in two stages, the first stage taking place while the composite is in the mould and the second stage taking place after the composite has been removed from the mould to complete cross-linking of the resin.

The resin may include crosslinking agents to promote or induce crosslinking of the resin. However, it is also possible to use resins which are self-crosslinking.

The tong preferably comprises a generally L-shaped member one arm of which is adapted to fit onto the take-out and the other arm of which is shaped to receive the jaw member. The jaw member may be formed around the other arm or may be fitted into a recess in the other arm having a shape complementary to the shape of the jaw member. Conveniently, the tong member is made of a strong material such as steel or, preferably, brass. The tong may also be formed as a unitary structure from the thermoset composite.

In use, each tong will be associated in a take-out with a similar complementary tong, the jaw members on the tongs being so shaped and located as to allow the tongs to contact and grip the glassware being manufactured so that the glassware may be transferred by the take-out from a mould bottom plate to a dead plate.

The tongs of the present invention have jaw members made of material of low thermal conductivity and low thermal capacity. Therefore, on contact with hot glassware, thermal shock damage will be substantially avoided. Moreover, the jaw members can be made of sufficient area to prevent any substantial amount of swinging during transfer. The material from which the jaw members are made will not chip or break easily and is not porous. The jaw members may be made without the need for any machining, although in some cases a small amount of machining may be necessary. Where, in the preferred embodiment, the fibrous filler is carbon fibre any necessary machining can be carried out in a normal workshop without any special precautions.

The present invention also includes a glassware manufacturing machine including a take-out having tongs according to the first aspect of the invention, and a jaw member for fitting onto a tong member to provide a tong according to the first aspect of the invention.

One embodiment of a tong according to the present invention is described, by way of example only, with reference to the accompanying drawings, in which

Figure 1 is an exploded perspective view of the tong, and

Figure 2 is a sectional side view of apparatus for using in forming the jaw member of the tong shown in Figure 1.

Referring now to Figure 1, there is shown a tong 1 to be fitted on a take-out used to transfer bottles from mould bottom plate on an IS bottle-forming machine to a dead plate. The tong 1 comprises a generally L-shaped brass tong member 2 having in one arm a fitting 4 for co-operation with the take-out and in the other arm a recess 3. A jaw member 5 is fitted into the recess 3 and has on one side a shape complementary to the shape of the recess 3 so that the jaw member 5 fits tightly into its recess 3. The jaw member 5 has notches 7 formed in it for co-operation with oval pins 8 which pass through holes 9 and fit into blind holes 10 to hold the jaw member 5 in place in the recess 3.

On the other side, the jaw member 5 has a concave area 6 for co-operation with a similar area 6 on the jaw member of a co-operating tong to enable the tongs to contact and grip a bottle formed in the mould.

The jaw member 5 is made from a mixture comprising:

35 parts of graphite (particle size 10 μm)

12.5 parts carbon fibre (averge length 6 mm, diameter 8 μm).

52.5 parts of resin (Kinel polyimide resin sold by Phone Poulenc Ltd.).

The mixture is extruded at a temperature of 120°C from a single screw extruder arranged in conveying configuration. The extrudate is granulated and a weighed quantity thereof is preheated at 120°C for 5 minutes. The preheated granulate is moulded into a jaw member 5 using the apparatus shown in Figure 2, to which reference is now also made.

The preheated granulate is placed on a mould plate 12 maintained at 160°C. A punch plate 11 maintained at 170°C is lowered by a hydraulic press so as to press the granulate on the mould plate 12 so that if flows through sprues 13 into cavities 14 which are held in place by cavity plate 15 maintained at 190°C. Pressure is maintained by the hydraulic press for a period of 7 minutes, whereupon the press is withdrawn and the

cavities 14 are opened to allow ejection of moulded jaw members 5. The jaw members are post cured at a temperature of 250°C for 16 hours to ensure complete cross-linking of the resin takes place.

A pair of tongs as described above was installed in each take-out of an 8 section dual IS bottle-forming machine set up to produce half litre capacity bottles having a standard 28 mm RO neck finish (the neck being as defined, for instance, in BS 6119, part 1, 1981). A manufacturing run lasting 8 days was carried out producing about 2 million bottles. At the end of the run, the tongs and especially the jaw members were inspected for wear and damage. However, no significant wear or damage was observed on any of the pairs of tongs.

During the manufacturing run a record was kept of the number of bottles rejected due to presence of checks in the finished product. It was found that this number was substantially less than the number recorded when using any of the types of tongs described in the prior art in the same machine over the same period of time. Furthermore the checks found in the rejected bottles made using the tongs of the present invention were caused by factors not related to the take-outs and could be corrected without adjusting the take-outs.

Thus the present invention provides take-out tongs for use in the manufacture of glassware which are an improvement over those presently used.

Claims (Filed on 7 July 1983)

1. A tong for use in a take-out in the manufacture of glassware, the tong having a jaw member comprising a thermoset composite of a particulate filler, a non-asbestos fibrous filler and a thermosetting resin, wherein each of the components of the composite is stable at temperatures up to 200°C.

2. A tong according to claim 1, wherein each of the components of the composite is stable at temperatures up to 250°C.

3. A tong according to claim 1 or claim 2, wherein the composite comprises 20 to 50% w/w particulate filler, 5 to 20% w/w non-asbestos fibrous filler and 30 to 75% resin.

4. A tong according to claim 3, wherein the composite comprises 40 to 70% resin.

5. A tong according to any one of claims 1 to 4, wherein the particulate filler is slate dust, carbon black, powdered shale or talc.

6. A tong according to any one of claims 1 to 4, wherein the particulate filler is graphite.

7. A tong according to any one of claims 1 to 7, wherein the particulate filler has an average particle size of 10 μm and a maximum particle size of 50 μm.

8. A tong according to any one of claims 1 to 7, wherein the fibrous filler is a ceramic fibre, glass fibre or an organic polyamide fibre.

9. A tong according to any one of claims 1 to 7, wherein the fibrous filler is a carbon fibre.

10. A tong according to any one of claims 1 to 9, wherein the fibres of the fibrous filler have a length up to 10 mm and a diameter of about 8 μm.

11. A tong according to any one of claims 1 to 10, wherein the resin is a poly-(amide-imide), polybenzimidazole, Friedel-Craft or polyphenylene resin.

12. A tong according to any one of claims 1 to 10, wherein the resin is a polyimide resin.

13. A tong according to any one of claims 1 to 12, wherein the jaw member is made by compression, transfer or injection moulding.

14. A tong according to claim 13, wherein the resin is thermoset in two stages, the first stage taking place while the composite is in the mould, and the second stage taking place after the composite has been removed from the mould to complete crosslinking of the resin.

15. A tong according to any one of claims 1 to 14 wherein the resin includes a crosslinking agent.

16. A tong according to any one of claims 1 to 14, wherein the resin is self-crosslinking.

17. A tong according to any one of claims 1 to 16 comprising a generally L-shaped member, one arm of which is adapted to fit onto the take-out, and the other arm of which is shaped to receive the jaw member.

18. A tong according to claim 17 wherein the jaw member fits in a recess in the other arm of the tong member.

19. A tong for use in a take-out in the manufacture of glassware, substantially as hereinbefore described with reference to Figure 1 of the accompanying drawings.

20. A glassware manufacturing machine including a take-out having tongs according to any one of claims 1 to 19.

21. A jaw member for fitting onto a tong member to provide a tong according to any one of claims 1 to 20.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1984. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.